

हैंडपंप सह सौर पंपिंग पद्धति — विशिष्टियाँ

Handpump cum Solar Pumping System — Specifications

ICS 23.100.10

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भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Handpumps Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard specifies the technical requirements for handpump cum solar pumping system and also prescribes the performance specifications and testing requirements.

This system is suitable for use on 100 millimeter diameter and above and up to a 100-meter head existing bore well. The existing bore well hand pumps can be upgraded for pumping water by using solar PV power. The system operates without grid power and battery backup. It assures drinking water and ensures sustainable, pollution-free, climate-friendly, reliable and user-friendly delivery system in rural areas.

In the preparation of this standard, considerable assistance has been derived from the following standards :

IEC 62253 : 2011	Photovoltaic pumping systems — Design qualification and performance measurements
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IEC 61215-1 : 2021	Terrestrial photovoltaic (PV) modules — Design qualification and type approval : Part 1 Test requirements
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The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

HANDPUMP CUM SOLAR PUMPING SYSTEM — SPECIFICATIONS

1 SCOPE

This standard specifies the technical requirements for “handpump cum solar pumping system”. This water pumping system is for pumping clear water from the bore well/tube well. The purpose of combining the solar pumping system and the handpump is to reduce efforts to pump water manually and to ensure uninterrupted and continuous access to safe drinking water. This system provides lifting of water to the overhead storage tank. Solar energy is stored in the form of water in an overhead tank thus avoiding the need of a battery system. This standard cover design qualifications and performance specifications.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in the text, constitute provisions of this standard. All standards are subject to revision, and parties to make agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

3 TERMINOLOGY

In addition to the terminology specified in 3 of IS 5120 and IEC 62253, the following shall also apply:

3.1 Static Water Level — It is the depth of water level below the ground level when the pump is not in operation.

3.2 Draw-Down — It is the elevation difference between the depth of static water level and the pumping water level in the bore well/tube well during the operation of the pump.

3.3 Submergence — It is the minimum height of the water level after drawdown above the pump.

3.4 Daily Water Output — It is the total water output on a clear sunny day under the “Average Daily Solar Radiation” condition of 7.15 kWh/m² on the surface of the photovoltaic (PV) array [(that is, coplanar with the photovoltaic (PV) Modules)].

3.5 Wire to Water Efficiency — It is the combined efficiency of solar photovoltaic panels (PV), pump controller with inbuilt maximum power point tracking (MPPT) mechanism, pump set and piping.

3.6 Clear Cold Water — Clear cold water means, water having a turbidity of maximum 50 ppm (silica scale).

NOTE — If turbidity of the water differs from those specified above, the pump details shall have to be agreed between the manufacturer/supplier and user, and shall be specified in the order.

3.7 Solar Pump Controller — The solar pump controller converts the DC voltage of the PV generator into a high or low DC voltage or converts this DC voltage and/or DC current into single-phase or multi- phase alternating voltage or alternating current. The controller shall have MPPT arrangement.

NOTE — The Solar Pump controller may also include equipment for monitoring, metering and protection purposes.

3.8 Maximum Power Point Tracker (MPPT) — MPPT is an algorithm that includes charge pump controllers used for extracting maximum available power from photovoltaic (PV) module under certain conditions. The voltage at which solar array can produce maximum power is called ‘maximum power point’ (or peak power voltage).

4 UNITS

Units shall be applied as specified in 2 of IS 5120.

5 CONSTRUCTIONAL FEATURES

General

Handpump cum solar pumping system set uses the solar energy available through solar array. The solar array produces DC power, which can be utilized to drive ac/dc submersible pump set using pump controller. The solar pump is lowered in the bore well below the cylinder of the handpump and same is integrated with the modified water tank of the handpump. Pumped water from the solar pump is stored in the overhead tank for distribution.

Whenever solar energy is not available water can be pumped from the bore well / tube well using handpump delivered at spout.

This system provides uninterrupted access to the water supply to users.

Fig. 1 and 2 shows the layout of this system and Fig. 3 shows dual pump arrangement.

6 HANDPUMP CUM SOLAR PUMPING SYSTEM

It consists of the following:

- a) Deep well hand pump.
- b) Submersible pump set with protection features
- c) Solar pump controller
- d) Photovoltaic (PV) array/PV panel.
- e) Tank tower structure
- f) Overhead water tank.
- g) Stand post.
- h) Essential accessories including cable, safety rope, pipeline, etc.

6.1 Handpump

Deep well handpump with modified water tank to integrate submersible pump to the handpump (Fig. 4).

6.1.1 Cylinder Assembly

6.1.1.1 Cast Iron/SS Cylinder Assembly as per IS 15500 for borehole diameter 150 mm and above.

6.1.1.2 SS Cylinder Assembly as per IS 15500 for bore hole below 150 mm.

6.1.2 Platform for Handpump

Please refer to IS 15500 for suggestive type designs as per site requirements.

6.2 Solar Submersible Pump Set

6.2.1 Pump End

- a) Stainless steel centrifugal submersible pump as per IS 17018 (Part 1).
- b) Stainless steel helical rotor submersible pump.

6.2.2 Motor

The motor of the submersible pump set may be of the following types:

- a) AC Induction motor along with suitable solar photovoltaic (PV) controller with inbuilt MPPT mechanism.
- b) Brushless DC motor/PMSM (Permanent Magnet Synchronous Motor) along with a suitable Controller with an inbuilt MPPT mechanism.

6.2.3 Parts coming in contact with water shall be made out of stainless steel as per IS 6603.

6.3 Pump Controller

6.3.1 It can be an inbuilt part of the pump

6.3.2 It may be mounted separately.

6.3.3 Controller must have maximum power point tracker (MPPT) to optimally use the solar panel and maximize water discharge.

6.3.4 Depending upon the water level in the overhead tank, the controller shall automatically turn ON/ OFF the pump. This system shall operate on solar energy. No battery is to be used.

6.3.5 Suitable water level sensor/switch to be provided in the overhead tank with suitable cables to sense water level fluctuation in the overhead tank.

6.3.6 It may be a discrete hardware device or micro-controller-based system or inverter inclusive of VFD as per norms of IEC/MNRE guidelines.

6.3.7 Minimum overall efficiency of the MPPT system shall be 94 percent.

6.3.8 Operating temperature range of the controller shall be between 10°C to 60°C.

6.3.9 The SPV Controller must have IP65 protection or shall be housed in a cabinet having at least IP65 protection.

6.3.10 A good reliable switch suitable for operation to be provided. A sufficient length of the cable shall be provided for interconnection of the PV array, controller and the motor solar pump set system(s).

6.3.11 Adequate protections shall be incorporated against the dry run operation of motor solar pump set system(s), lightning, hails and storms.

6.3.12 Full protection against the open circuit, accidental short circuit and reverse polarity shall be provided.

6.3.13 Proper earthing arrangement shall be given.

6.3.14 Float switch fault detection facility shall be provided.

6.4 Remote Monitoring System

Wherever required, provision for remote monitoring of the installed solar pumps must be made in the controller either through an integral arrangement or through an externally fitted arrangement.

6.5 Photovoltaic (PV) Panels

6.5.1 The solar photovoltaic (PV) water pumping system shall be operated with a PV array of suitable

capacity as per the requirement of water output and dynamic head. A sufficient number of modules in series and parallel could be used to obtain the required PV array power output and voltage. The power output of individual PV modules used in the PV array, under Standard Test Conditions (STC), shall have a minimum of 200 watts peak, with adequate provision for measurement tolerances. The use of PV modules with higher power output is preferred.

6.5.2 Photovoltaic (PV) module(s) containing mono/multi-crystalline silicon solar cells shall be used in the PV array for the solar PV water pumping systems.

6.5.3 Modules supplied with the solar photovoltaic (PV) water pumping systems shall have a certificate as per IS 14286-1/IEC 61215-1 specifications.

6.5.4 PV modules shall be as per IS/IEC 61730 (Part 1 and Part 2) for safety qualifications.

6.5.5 Efficiency of the PV modules shall be minimum 15 percent and fill factor shall be more than 70 percent.

6.5.6 The terminal box on the PV module shall have a provision for "Opening" to replace the cable if required.

6.5.7 A nameplate shall be fixed inside the module which shall indicate the following:

- a) Name of the manufacturer or distinctive logo;
- b) Model number;
- c) Serial number;
- d) Year of manufacture and
- e) Capacity

6.5.8 Before conducting testing, the PV module shall be preconditioned at Standard Test Conditions (STC) for 3 days at average radiation of 5.5 kWh/m².

6.5.9 PV module mismatch shall be within ± 3 percent tolerance.

6.5.10 PV module wattage after testing shall be within ± 3 percent tolerance of rated wattage.

6.6 Tank Mounting Structure

6.6.1 Raw Material

6.6.1.1 Components of the structure shall be made out of M.S. tubes, square tubes, angles and channels covered under Quality A of Grade E 250 of IS 2062 to withstand self-weight and weight of 2000 to 5000 liters of water at wind speed of 150 km/hr.

6.6.1.2 Structure can be of 3, 4.5, 6 meters or higher

height as per the requirement of the buyer.

6.6.1.3 Preferably structures shall be in knockdown condition for ease of transportation and installation. (see Fig. 5, 6, 7, 8, 9 and 10)

6.6.2 Welding

6.6.2.1 Various mild steel components of the structure shall be welded in accordance with IS 9595.

6.6.2.2 Unless otherwise specified, the minimum specified thickness of the metal to be welded shall be the guiding factor for deciding the weld fillet size. It shall normally be not less than the specified thickness of the metal to be welded.

6.6.3 Anti-Rusting Treatment – Galvanizing

6.6.3.1 All the components of the structure shall be hot-dip galvanized in accordance with IS 2629 and IS 4759.

6.6.3.2 All the fasteners used for the structure shall be hot-dip galvanized as per IS 1367 (Part 13)/ISO 10684.

6.6.4 Workmanship

6.6.4.1 All the components shall be free from rough edges, burrs and other surface defects.

6.6.4.2 All the components of the structure when assembled shall be free from internal stresses. The members of the structure shall have interchangeability. Components/members of the structure shall fit in the place freely without applying any external forces while installing the structure on site.

6.6.5 Panel Mounting Structure

6.6.5.1 Panels can be mounted on tank tower structures as per Fig. 6, 7, 8, 9 and 10.

6.6.5.2 Panels can be mounted separately on a single pole arrangement at a minimum height of 2 500 mm.

6.6.5.3 Single panel structure shall be made out of pipe confirming to IS 1161 or tube confirming to IS 4923.

6.6.5.4 Channels and angles confirming to quality A of grade E 250 of IS 2062 may be used as the support structure for the panels.

6.6.6 Foundation for Tank Tower Structure and Single Pole Structure

It shall be made out of RCC. Design of the structure foundation shall be suitable to withstand self-weight

of structure, deadweight of the tank with water and wind forces acting on the structure.

6.7 Stability Certificate

The structure design shall be approved by the qualified structural engineer for its stability at wind speed of 150 km/hr.

6.8 LLDPE Tank

6.8.1 LLDPE tank of 2 000 to 5 000 litres capacity in accordance with IS 12701.

6.9 Stand Post

6.9.1 Prefabricated hot-dipped galvanized stand post square pipe with 1, 2 or 4 stainless steel 25 mm taps with the self-closing arrangement (see Fig. 12).

6.9.2 Platform for Stand Post

Min 1 000 × 1 000 mm square or circular in shape, platform made of grade 10 concrete with proper drainage arrangement. To strengthen the platform in loose formation, rubble soling of min 300 mm depth shall be provided. Alternatively, mild steel reinforcement may be provided. (see Fig. 12)

6.10 Miscellaneous Accessories

6.10.1 HDPE Pipe

HDPE pipe conforming to IS 4984 of appropriate material grade and pressure according to the depth of submersible pump in the bore well/tube well.

6.10.2 Stainless Steel Nipples

Nipples shall be made out of stainless steel suitable to connect HDPE pipe to the submersible pump and to the modified water tank of the hand pump.

6.10.3 Submersible Cable

6.10.3.1 Three core cables made of copper class 2 conforming to IS 694, of minimum 1.5 Sq. mm shall be used.

6.10.3.2 Cable length shall be 10 m more than drop cable to connect the pump to controller.

6.10.4 Cable Ties

A cable tie of 150 mm length shall be used to tie the cable with the HDPE pipe of the submersible pump.

6.10.5 Delivery Pipe

6.10.5.1 Medium class GI pipe confirming to IS 1879 of appropriate diameter shall be used as delivery pipe whenever exposed to the sun.

6.10.5.2 GI pipe fittings shall be used in accordance with IS 1879.

6.10.5.3 For underground water delivery arrangement Class 3 uPVC pipes as per IS 4985 may be used with appropriate fittings.

6.10.6 Underground Cable Connection

Appropriate size of uPVC pipe confirming to IS 4985 shall be used to lay underground cable to connect pump to the controller and controller to PV array.

6.10.7 Earthing

Proper earthing arrangements confirming to IS 3043 shall be provided for pump, PV array and controller with dedicated mounting arrangement. GI wire of min 5 mm diameter or mild steel strip of 25 × 3 mm thickness, duly galvanized with proper bolting arrangement shall be used to connect earthing arrangement.

6.10.8 Lightning Arrester

Lightning arrester confirming to IS/IEC 62305 (Part 1) shall be provided on the panel mounting structure at the highest point. It shall be connected through a minimum 10 sq. mm single core aluminum cable to the earthing arrangement.

7 BOREWELL/TUBEWELL

7.1 Diameter of bore well/tube well shall be minimum 115 mm to accommodate delivery pipes of submersible pump and cylinder of handpump.

7.2 Bore well/Tube well shall be thoroughly flushed/developed to make it free from sand/mud.

7.3 Bore well/tube well shall have a minimum yield of 1 200 litre per hour.

7.4 Capacity of pump shall be decided on yield and drawdown of bore well/tube well.

8 DISCHARGE OF SOLAR PUMPS (7.15 kWh/m²)

Pump shall confirm to the discharge norms for drinking water as given in Table 1, 2 and 3:

**Table 1 — 2.0 HP Submersible Pump Capacity
1800 Wp
(Clause 8)**

Sl. No.	Dynamic Head m	Shut of Head m	Discharge (Litres per Day)
(1)	(2)	(3)	(4)
i)	60	90	20 000
ii)	90	120	10 000
iii)	120	150	5 000

**Table 2 — 1.0 HP Submersible Pump Capacity
900 Wp
(Clause 8)**

Sl. No.	Dynamic Head m	Shut of Head m	Discharge (Litres per Day)
(1)	(2)	(3)	(4)
i)	30	45	20 000
ii)	60	90	10 000
iii)	90	120	5 000

**Table 3 - 0.5 HP Submersible Pump Capacity
500 Wp
(Clause 8)**

Sl. No.	Dynamic Head m	Shut of Head m	Discharge (Litres per Day)
(1)	(2)	(3)	(4)
i)	10	12	20 000
ii)	20	30	10 000
iii)	30	45	6 000

9 DANGER SIGNS

Danger mark shall be displayed on the panel

mounting structure and controllers at the appropriate location as per Fig. 13 and 13-A.

10 TESTING

10.1 Submersible pump, solar panels and pump controller models shall be type tested as per guidelines of MNRE in NABL accredited lab or NISE (National Institute of Solar Energy).

10.2 Handpump shall be tested as per IS 15500.

11 WARRANTY

Handpump cum solar pumping system shall have a warranty for one year from the date of installation and commissioning and 18 months from supply against manufacturing defect.

12 MARKING

12.1 Stainless steel laser marked nameplate of min 3 mm thickness, giving suppliers and solar pump details shall be displayed on the column of tank tower structure and the controller at the appropriate place.

12.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

13. PACKING

13.1 Submersible pump shall be packed in a cardboard carton.

13.2 Panels shall be individually packed in a cardboard carton.

13.3 Hand Pump and components shall be packed as per IS 15500.

13.4 Tank tower structure, panel mounting structure and its components shall be properly packed to avoid rubbing with each other during transport.

13.5 Small miscellaneous components and nut bolts shall be packed in a cardboard carton.

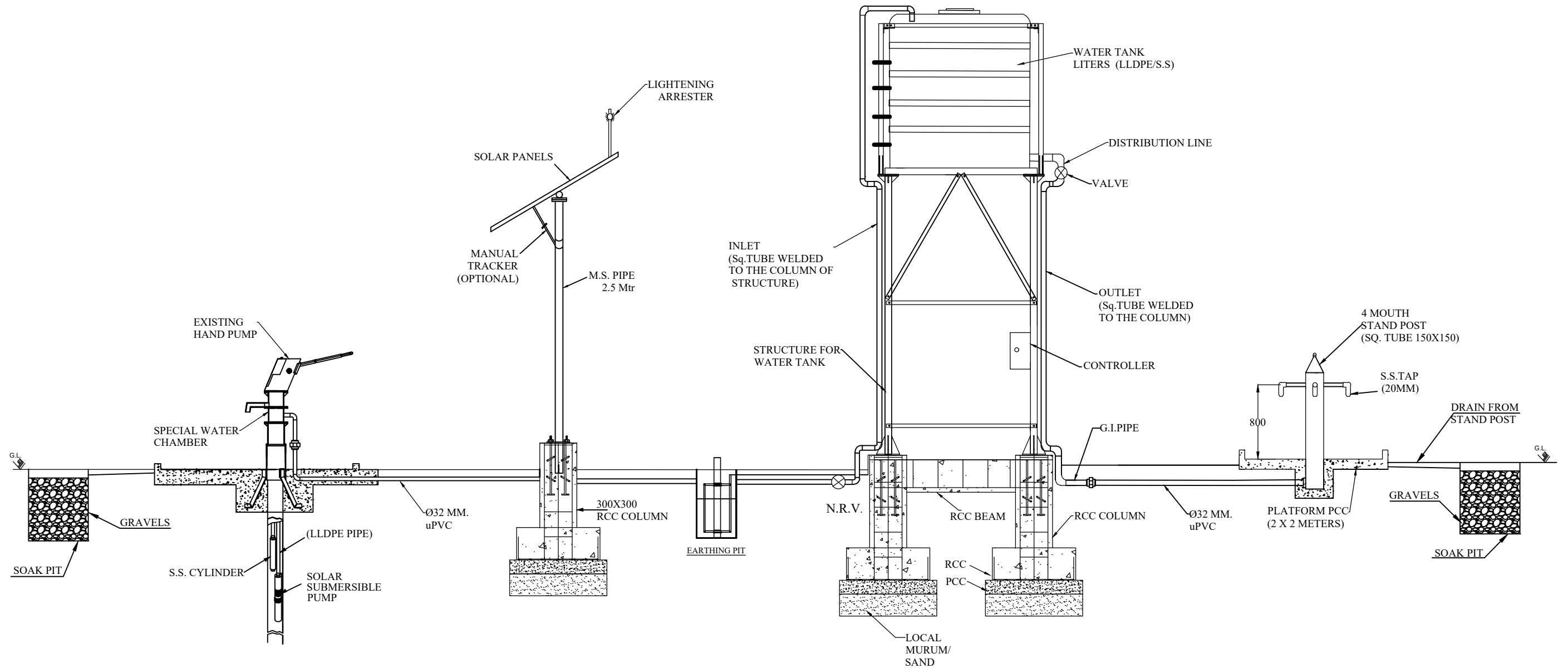
ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>
IS 694 : 2010	Polyvinyl chloride insulated unsheathed and sheathed cables/cords with rigid and flexible conductor for rated voltages up to and including 450/750 V (<i>fourth revision</i>)
IS 1239 (Part 1) : 2004	Steel tubes, tubulars and other wrought steel fittings — Part 1 Steel tubes (<i>sixth revision</i>)
IS 1239 (Part 2) : 2011	Steel tubes, tubulars and other steel fittings — Part 2 Steel pipe fittings (<i>fifth revision</i>)
IS 1879 : 2010	Malleable cast iron pipe fittings — Specification (<i>third revision</i>)
IS 2062 : 2011	Hot rolled medium and high tensile structural steel (<i>seventh revision</i>)
IS 2629 : 1985	Recommended practice for hot-dip galvanizing of iron and steel (<i>first revision</i>)
IS 4759 : 1996	Hot-dip zinc coatings on structural steel and other allied products (<i>third revision</i>)
IS 4985 : 2021	Un-plasticized PVC pipes for potable water supplies (<i>fourth revision</i>)
IS 5120 : 1977	Technical requirements for rotodynamic special purpose pumps (<i>first revision</i>)
IS 9595 : 1996	Metal arc welding of carbon and carbon manganese steels — Recommendations (<i>first revision</i>)
IS 12701 : 1996	Rotational molded polyethylene water storage tanks (<i>first revision</i>)
IS 15500 (Part 1 to 8) : 2021	Deepwell hand pumps components and special tools — Specification (<i>first revision</i>)
IS 17018 : Part 1 : 2018	Solar photovoltaic water pumping systems — Part 1 Centrifugal pumps — Specification (<i>first revision</i>)
IS 6603 : 2001	Stainless steel bars and flats — Specification (<i>first revision</i>)
IS 1161 : 2014	Steel tubes for structural purposes — Specification (<i>fifth revision</i>)
IS 4923 : 2017	Hollow steel sections for structural use — Specification (<i>third revision</i>)
IS 1367 : Part 13 : 2020/ ISO 10684 : 2004	Technical supply conditions for threaded steel fasteners : Part 13 Hot dip galvanized coatings on threaded fasteners (<i>third revision</i>)
IS 3043 : 2018	Code of practice for earthing (<i>second revision</i>)
IS/IEC 61730 (Part 1) : 2016	Photovoltaic (PV) module safety qualification — Part 1 Requirements for construction (<i>first revision</i>)

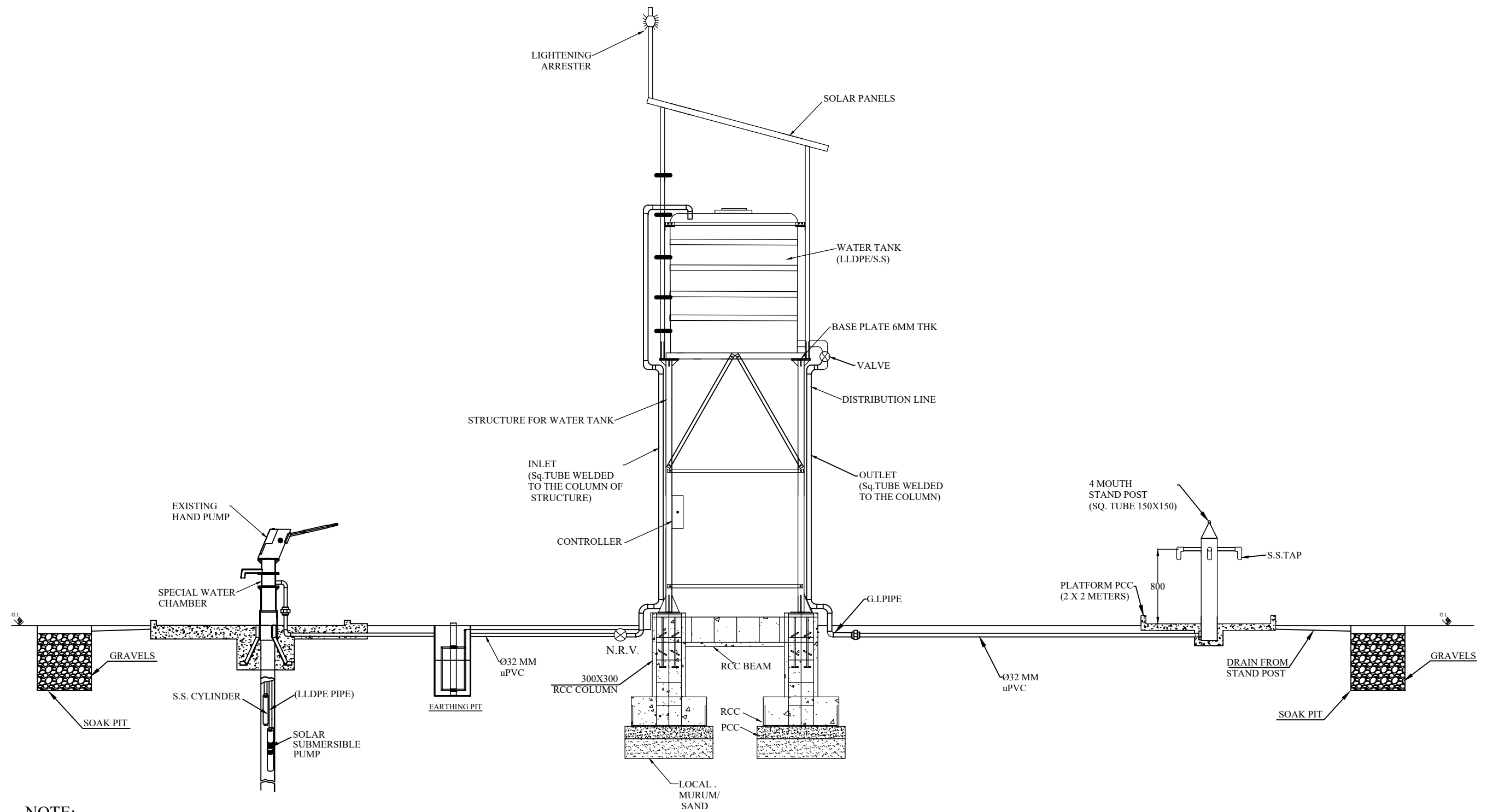
<i>IS No.</i>	<i>Title</i>
IS/IEC 61730 (Part 2) : 2019	Photovoltaic (PV) module safety qualification — Part 2 requirements for testing (<i>first revision</i>)
IS/IEC 62305 : Part 1 : 2010	Protection against lightning : Part 1 General principles
IS 14286 (Part 1) : 2019	Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval — Part 1 Test Requirements (<i>second revision</i>)
IS 2551 : 1982	Danger notice plates (<i>first revision</i>)



NOTE:

- 1) DRAWING NOT TO SCALE.
- 2) ALL DIMENSIONS ARE IN MM.
- 3) FOUNDATION MAY VARY AS PER LOAD BEARING CAPACITY OF SOIL
- 4) LENGTH OF THE UNDERGROUND PIPE MAY CHANGE AS PER SITE CONDITION.
- 5) STRUCTURE IS HOT DEEP GALVANIZED

FIG. 1 LAYOUT FOR HAND PUMP CUM SOLAR PUMPING SYSTEM ARRANGEMENT
(PANELS ON SINGLE POLE ARRANGEMENT)

**NOTE:**

- 1) DRAWING NOT TO SCALE.
- 2) ALL DIMENSIONS ARE IN MM.
- 3) FOUNDATION MAY VARY AS PER LOAD BEARING CAPACITY OF SOIL
- 4) LENGTH OF THE UNDERGROUND PIPE MAY CHANGE AS PER SITE CONDITION.
- 5) STRUCTURE IS HOT DEEP GALVANIZED

FIG. 2 LAYOUT FOR HAND PUMP CUM SOLAR PUMPING SYSTEM ARRANGEMENT
(PANELS ON TANK STRUCTURE ARRANGEMENT)

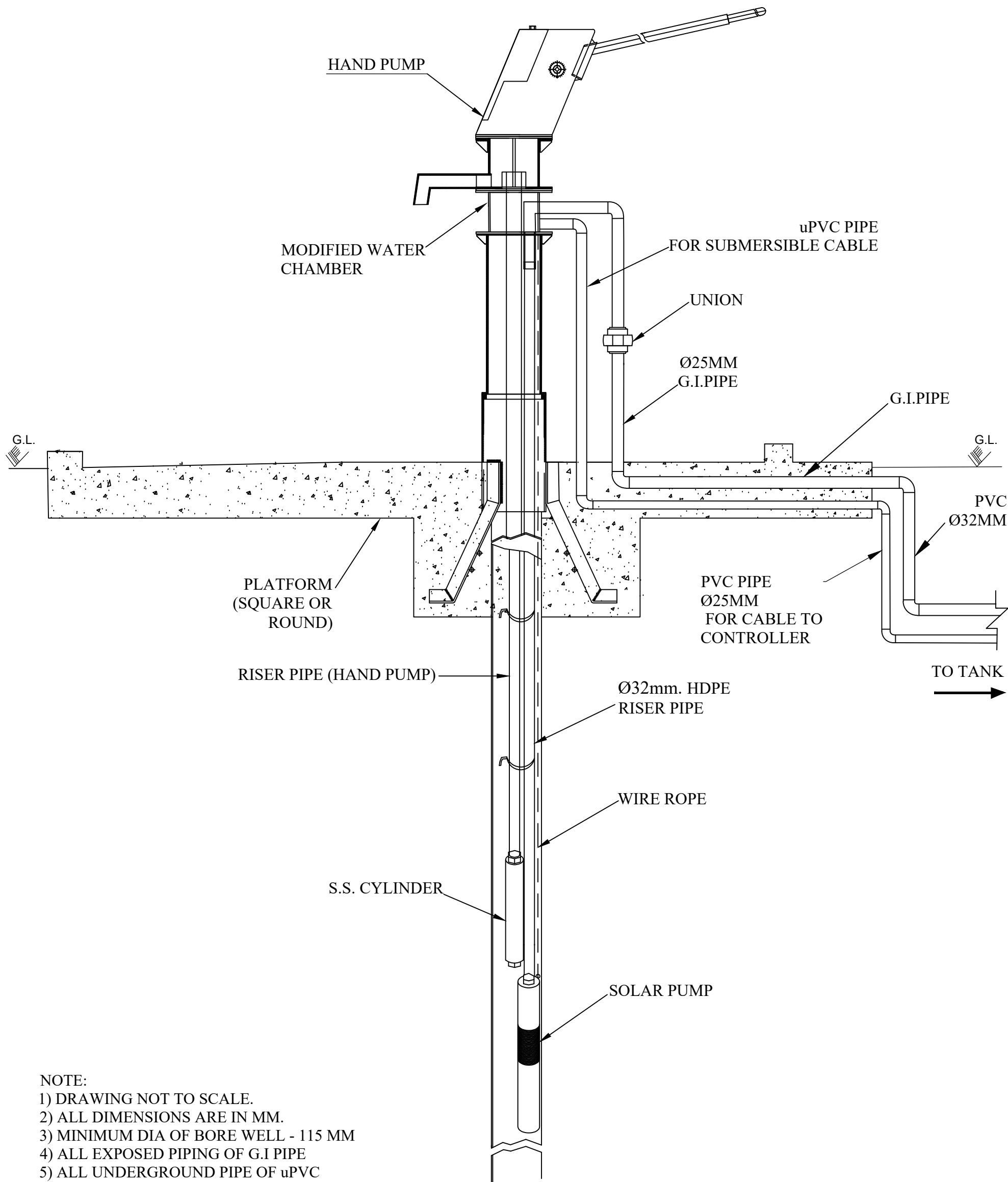
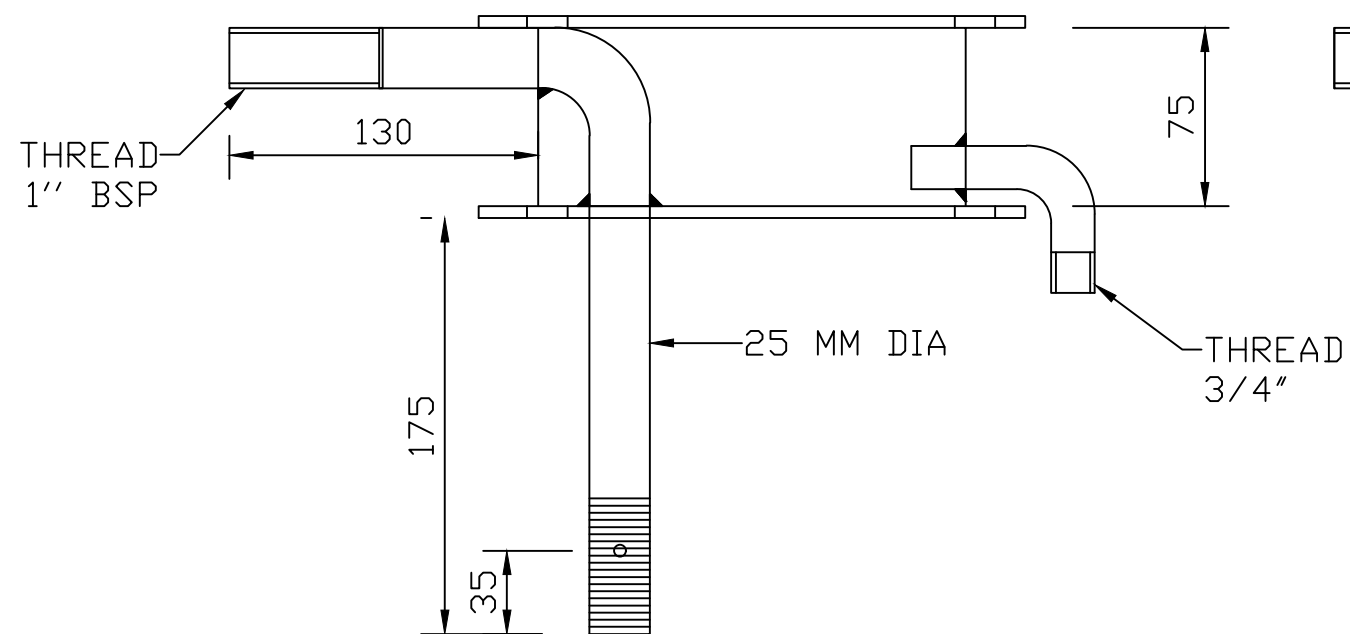
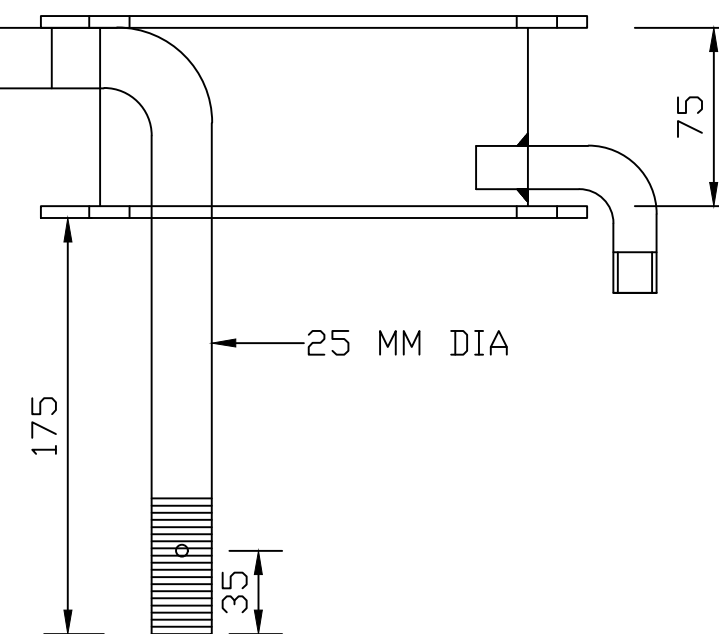


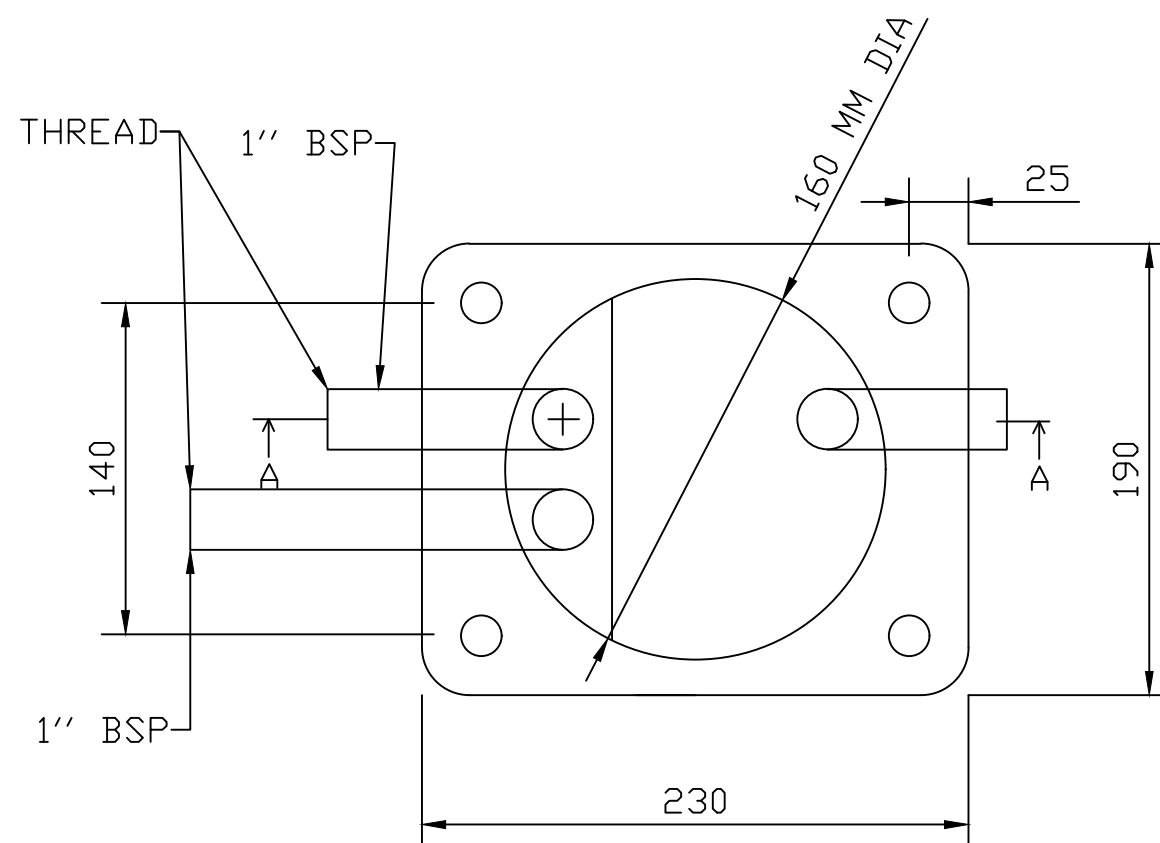
FIG. 3 INDIVATIVE DRAWING FOR REFERENCE
HAND PUMP CUM SOLAR SYSTEM ARRANGEMENT



FRONT ELEVATION



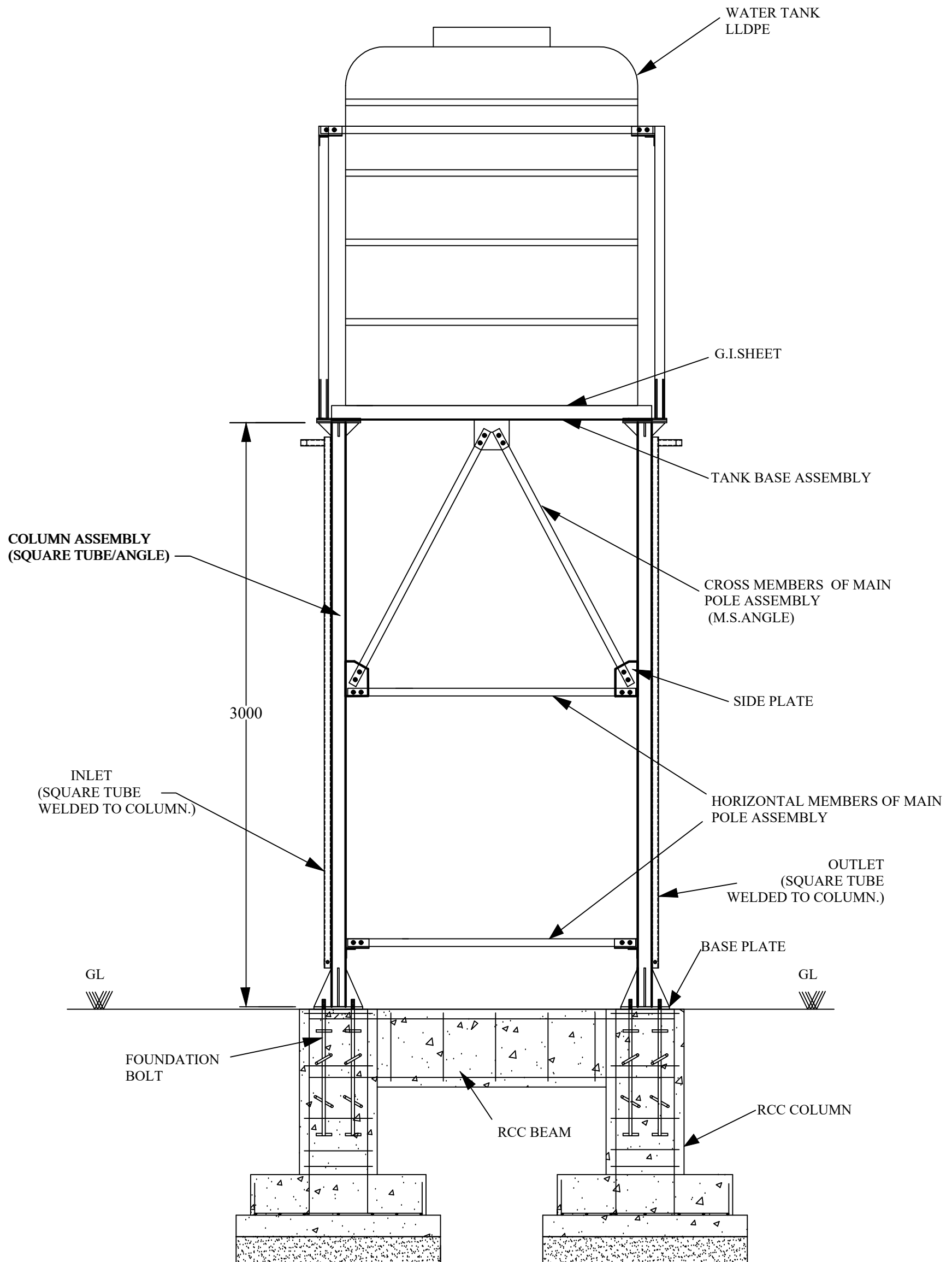
SECTION A-A



TOP VIEW

- 1) ALL DIMENSIONS ARE IN MM
- 2) DRAWING NOT THE SCALE
- 3) WATER TANK IS HOT DEEP GALVANIZED
- 4) BORE DIA MINIMUM 115 MM

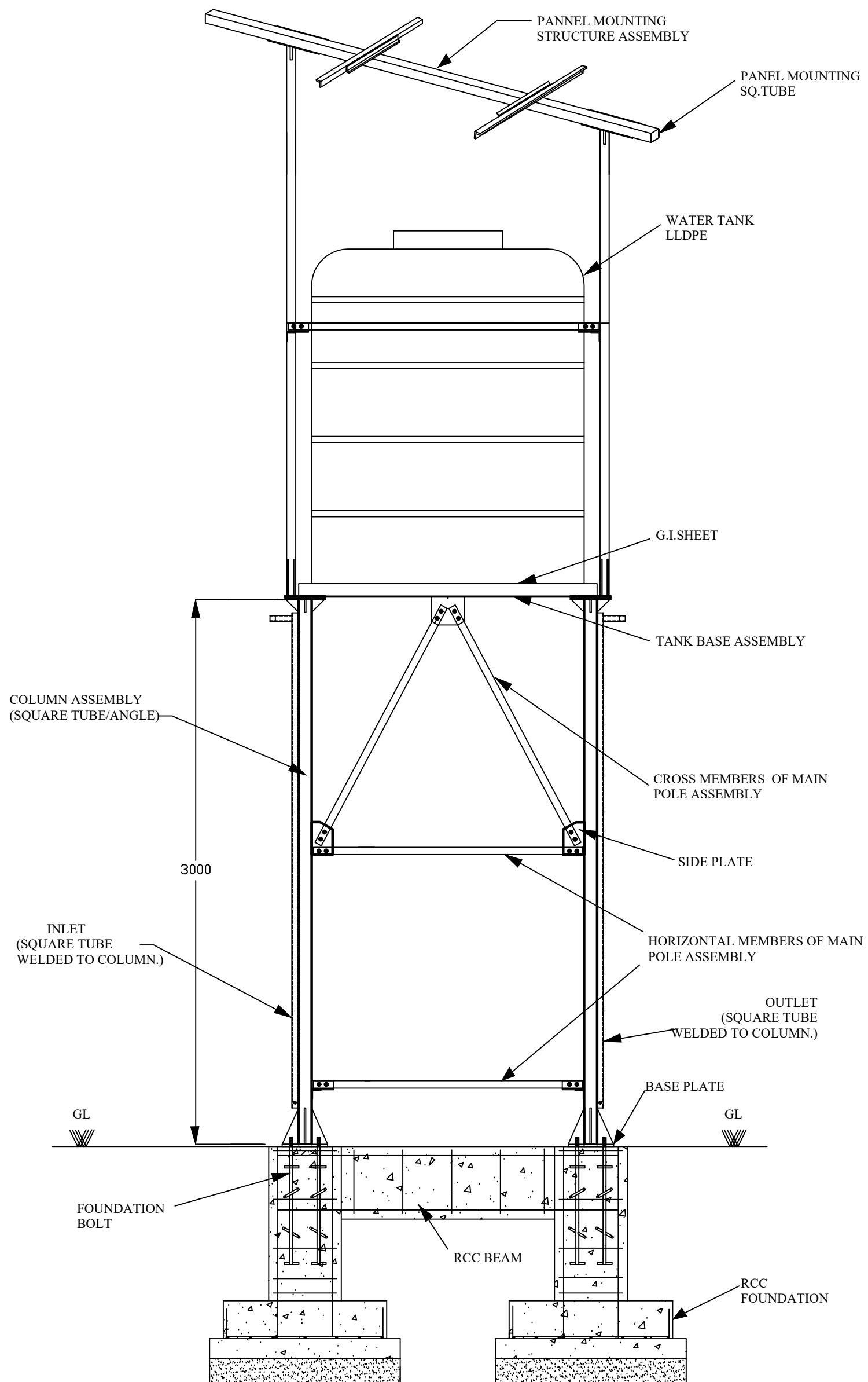
FIG. 4 MODIFIED WATER CHAMBER OF HAND PUMP INDICATIVE DRAWING
FOR REFERENCE



NOTE:

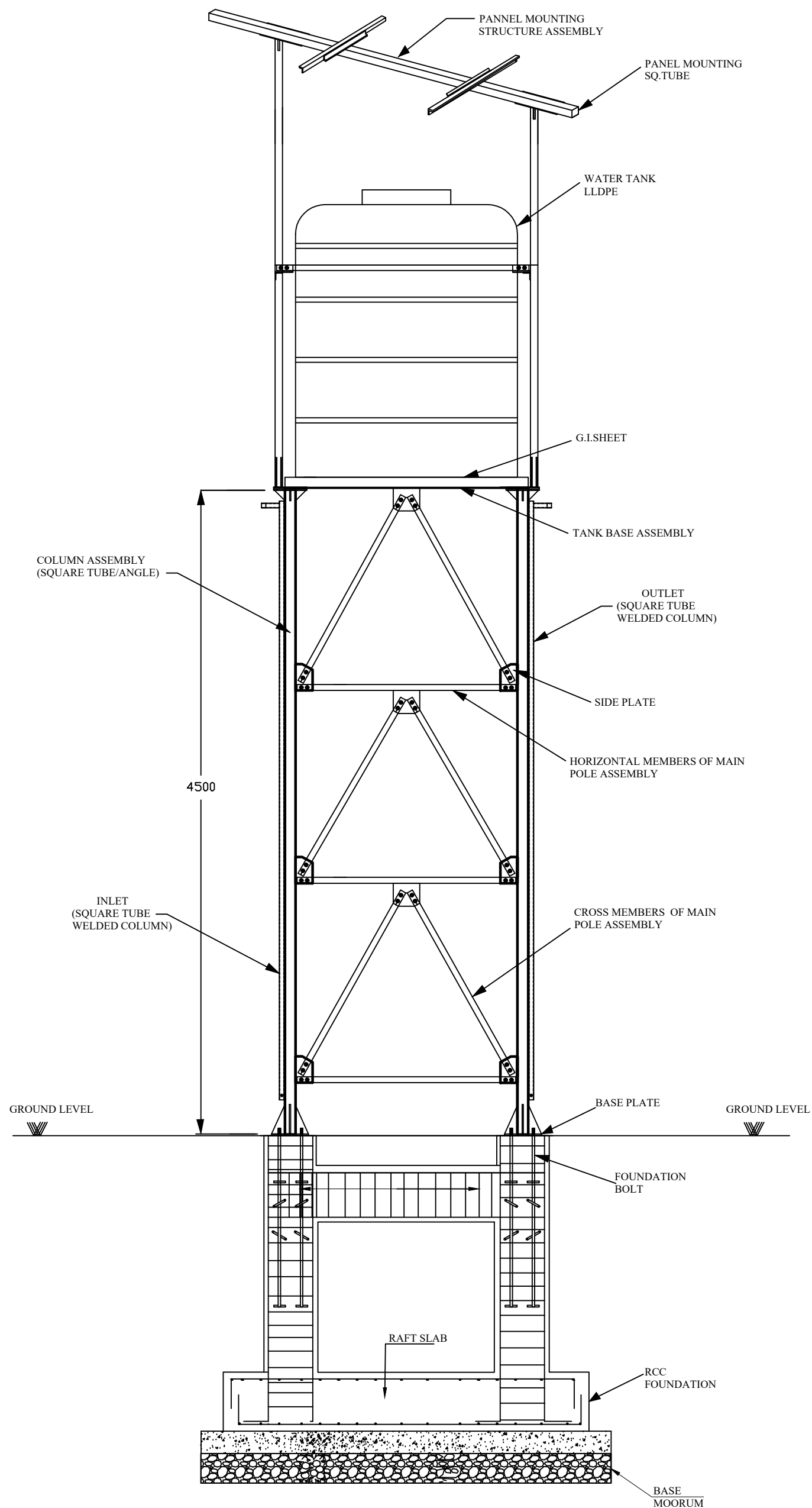
- 1) DRAWING NOT TO SCALE.
- 2) FOUNDATION DESIGN WILL CHANGE AS PER GROUND CONDITION.
- 3) FORM TO BE USED TO CAST THE FOUNDATION
- 4) STRUCTURE IS HOT DEEP GALVANIZED
- 5) STABILITY CERTIFICATE FOR STRUCTURE AND FOUNDATION IS ESSENTIAL
- 6) STRUCTURE COMPONENTS ARE HOT DEEP GALVANIZED

FIG.5 INDICATIVE TYPE DESIGN FOR REFERENCE TANK TOWER
STRUCTURE (MODULAR) 3 MTR.

**NOTE:**

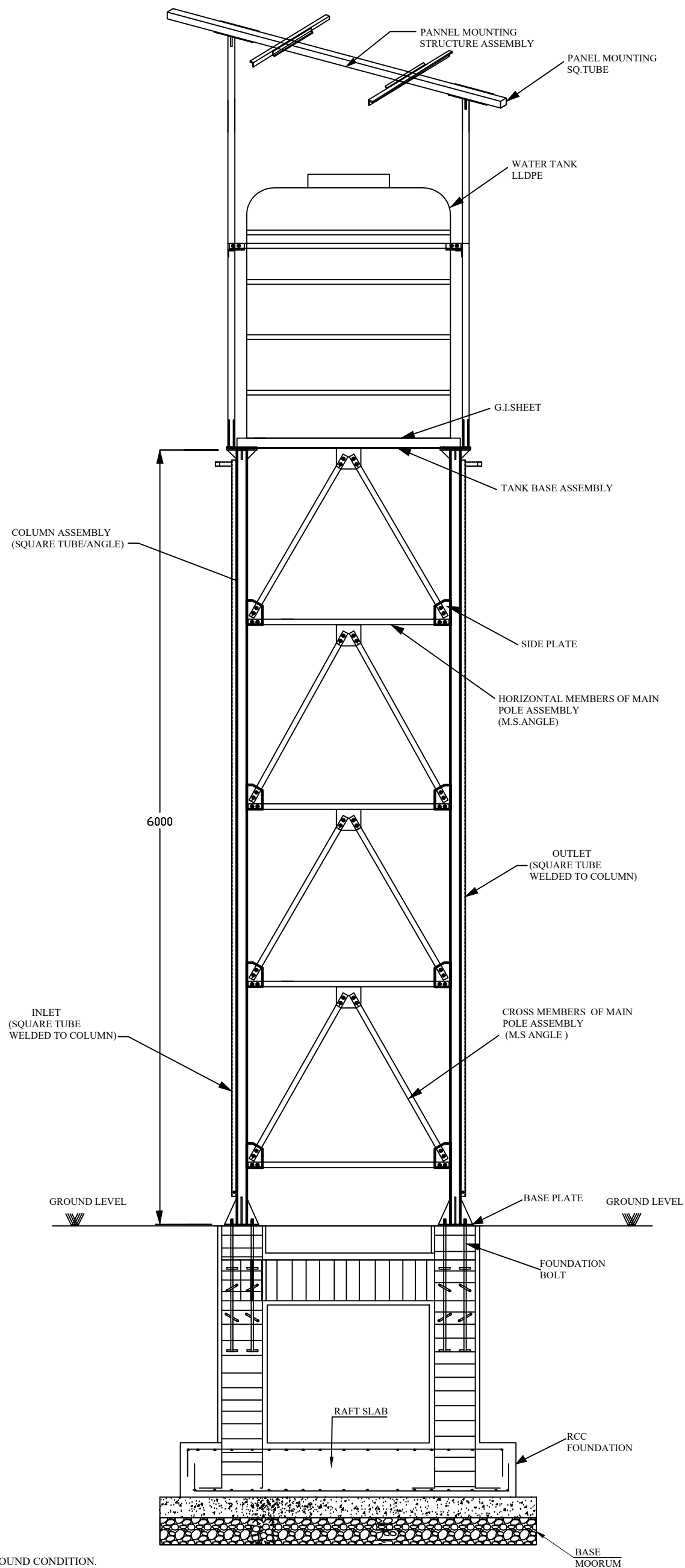
- 1) DRAWING NOT TO SCALE.
- 2) FOUNDATION DESIGN WILL CHANGE AS PER GROUND CONDITION.
- 3) FORM TO BE USED TO CAST THE FOUNDATION
- 4) STRUCTURE IS HOT DEEP GALVANIZED
- 5) STABILITY CERTIFICATE FOR STRUCTURE AND FOUNDATION IS ESSENTIAL
- 6) STRUCTURE COMPONENTS ARE HOT DEEP GALVANIZED

**FIG. 6 INDICATIVE TYPE DESIGN FOR REFERENCE TANK TOWER
AND PANEL STRUCTURE (MODULAR) 3 MTR.**



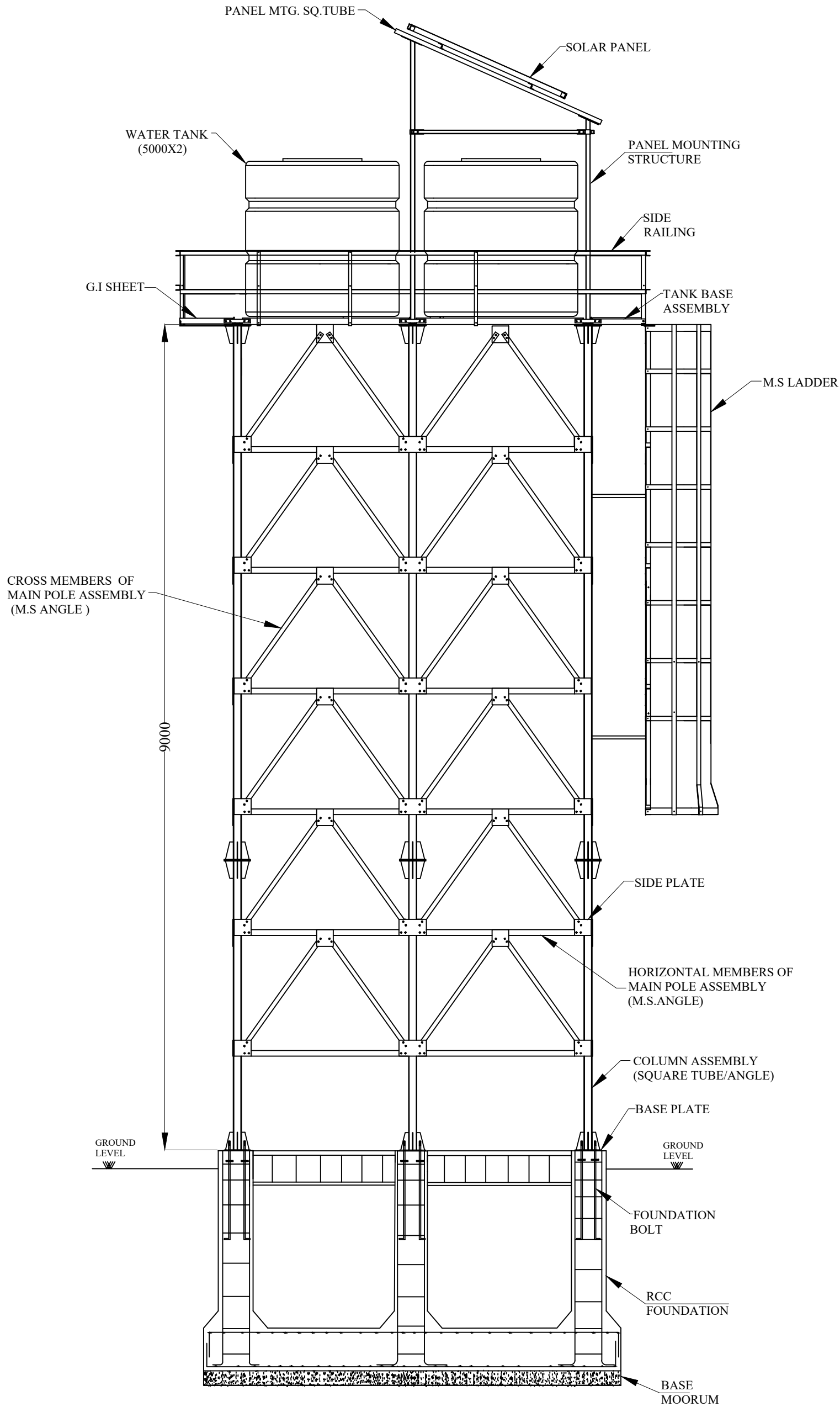
NOTE:
1) DRAWING NOT TO SCALE.
2) FOUNDATION MAY VARIES AS PER GROUND CONDITION.
3) FORMA TO BE USED TO CAST THE FOUNDATION
4) STRUCTURE IS HOT DEEP GALVANIZED
5) STABILITY CERTIFICATE FOR STRUCTURE AND FOUNDATION IS ESSENTIAL
6) STRUCTURE COMPONENTS ARE HOT DEEP GALVANIZED

FIG. 7 INDIVATIVE TYPE DESIGN FOR REFERENCE TANK TOWER AND
PANEL STTUCTURE (MODULAR) 4.5 MTR.



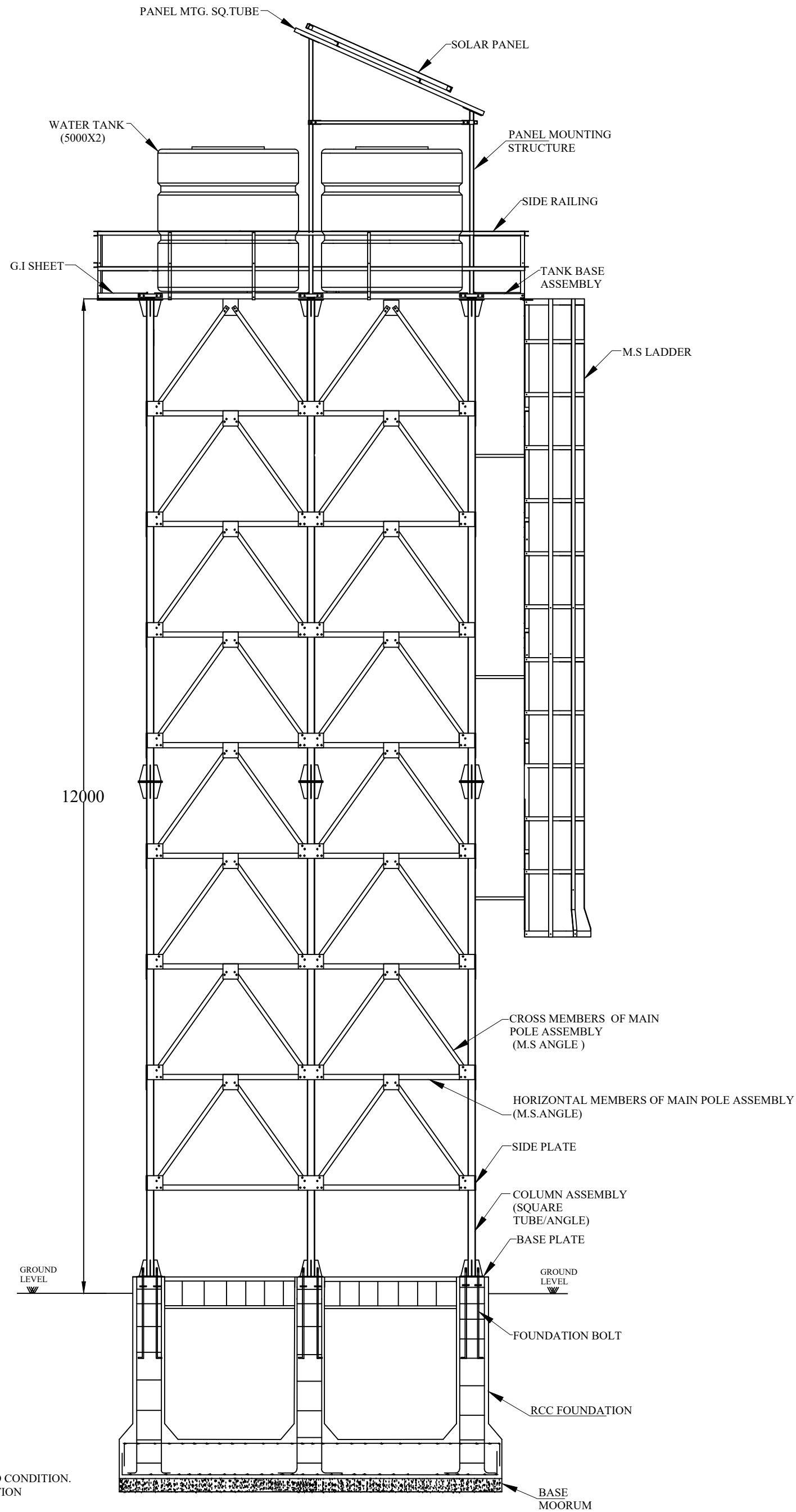
- NOTE:
- 1) DRAWING NOT TO SCALE.
 - 2) FOUNDATION MAY Varies AS PER GROUND CONDITION.
 - 3) FORM TO BE USED TO CAST THE FOUNDATION
 - 4) STRUCTURE IS HOT DEEP GALVANIZED
 - 5) STABILITY CERTIFICATE FOR STRUCTURE AND FOUNDATION IS ESSENTIAL
 - 6) STRUCTURE COMPONENTS ARE HOT DEEP GALVANIZED

FIG. 8 INDIVATIVE TYPE DESIGN FOR REFERENCE TANK TOWER AND PANEL STRUCTURE (MODULAR) 6 MTR.



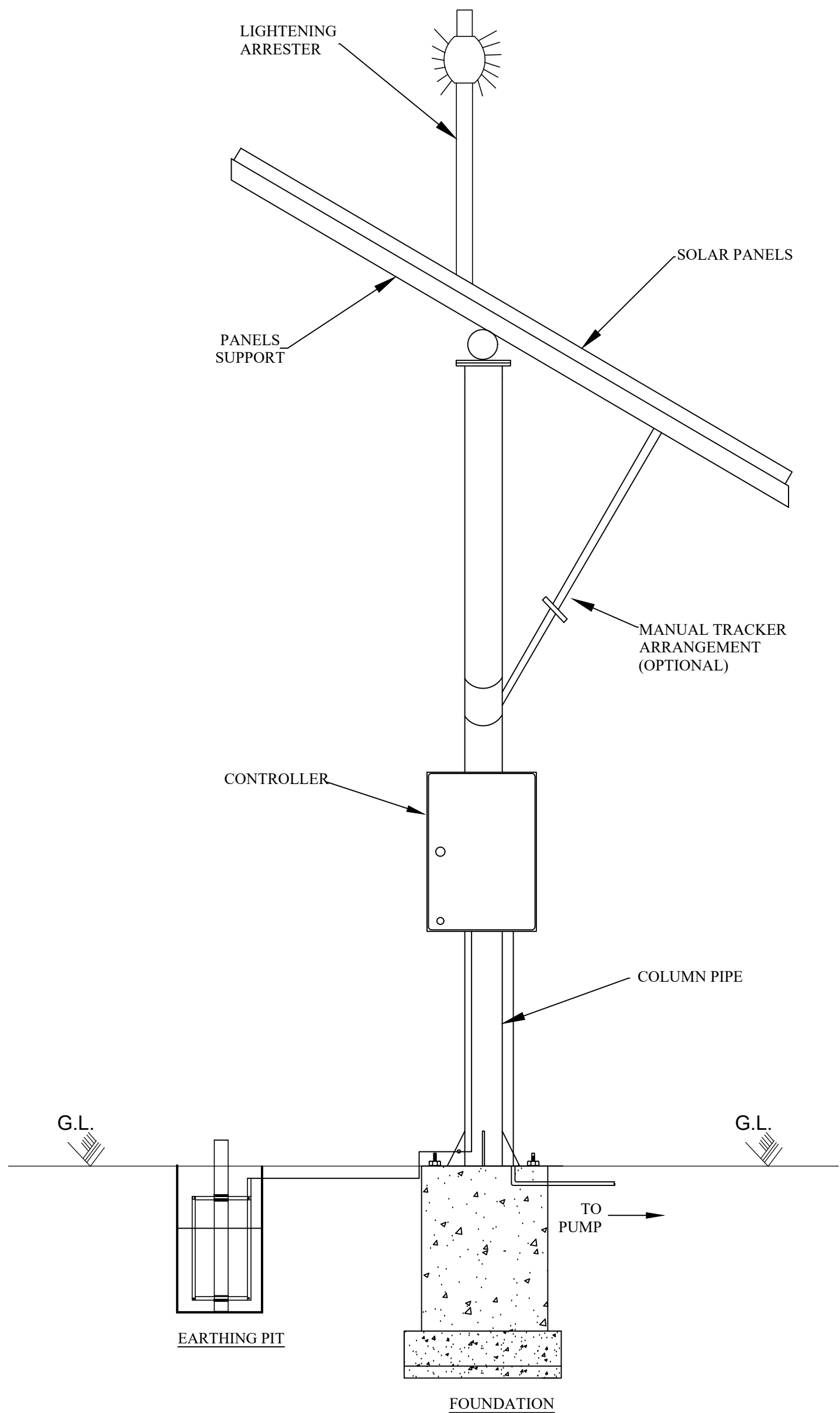
- NOTE:
- 1) DRAWING NOT TO SCALE.
 - 2) FOUNDATION MAY VARIES AS PER GROUND CONDITION.
 - 3) FORMA TO BE USED TO CAST THE FOUNDATION
 - 4) STRUCTURE IS HOT DEEP GALVANIZED
 - 5) STABILITY CERTIFICATE FOR STRUCTURE AND FOUNDATION IS ESSENTIAL
 - 6) STRUCTURE COMPONENT IS HOT DEEP GALVANIZED

FIG. 9 INDICATIVE TYPE DESIGN FOR REFERANCE TANK TOWER
AND PANEL STRUCTURE (MODULAR) 9 MTR.



NOTE:
1) DRAWING NOT TO SCALE.
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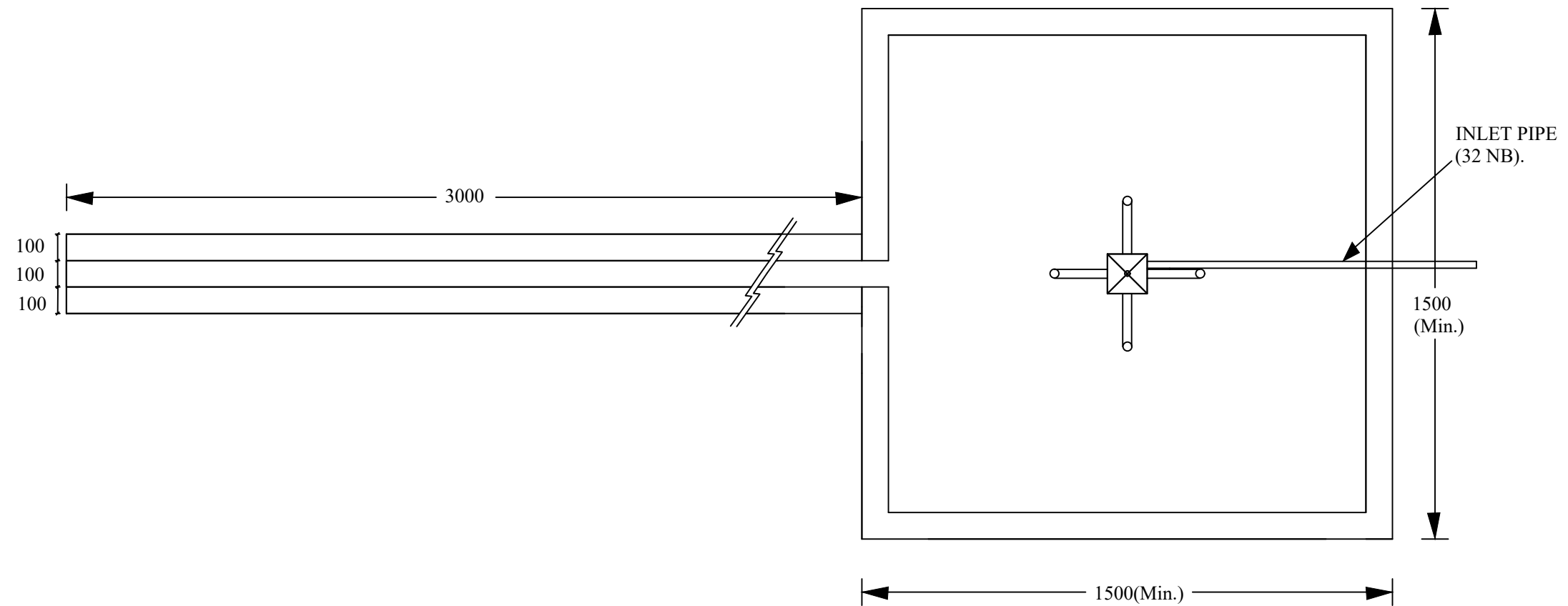
FIG. 10 INDICATIVE TYPE DESIGN FOR REFERENCE TANK TOWER
AND PANEL STRUCTURE (MODULAR) 12 MTR.



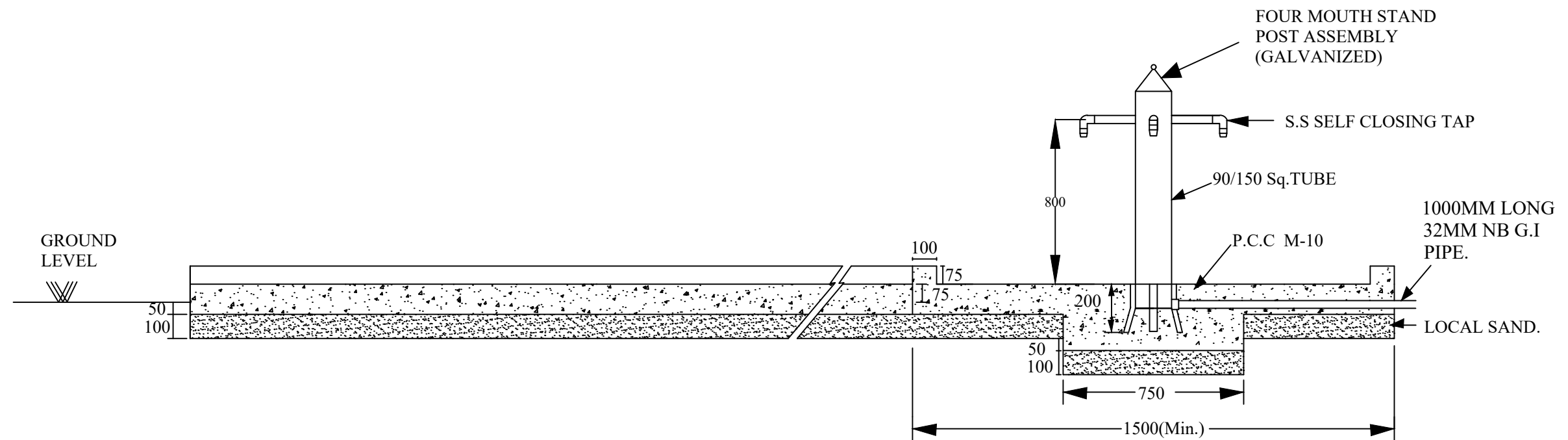
NOTE:

- 1) DRAWING NOT TO SCALE.
- 2) FOUNDATION MAY VARIES AS PER SITE CONDITION.
- 3)STRUCTURE IS HOT DEEP GALVANIZED

FIG. 11 INDICATIVE TYPE DESIGN FOR REFERENCE
SINGLE POLE PANEL STRUCTURE

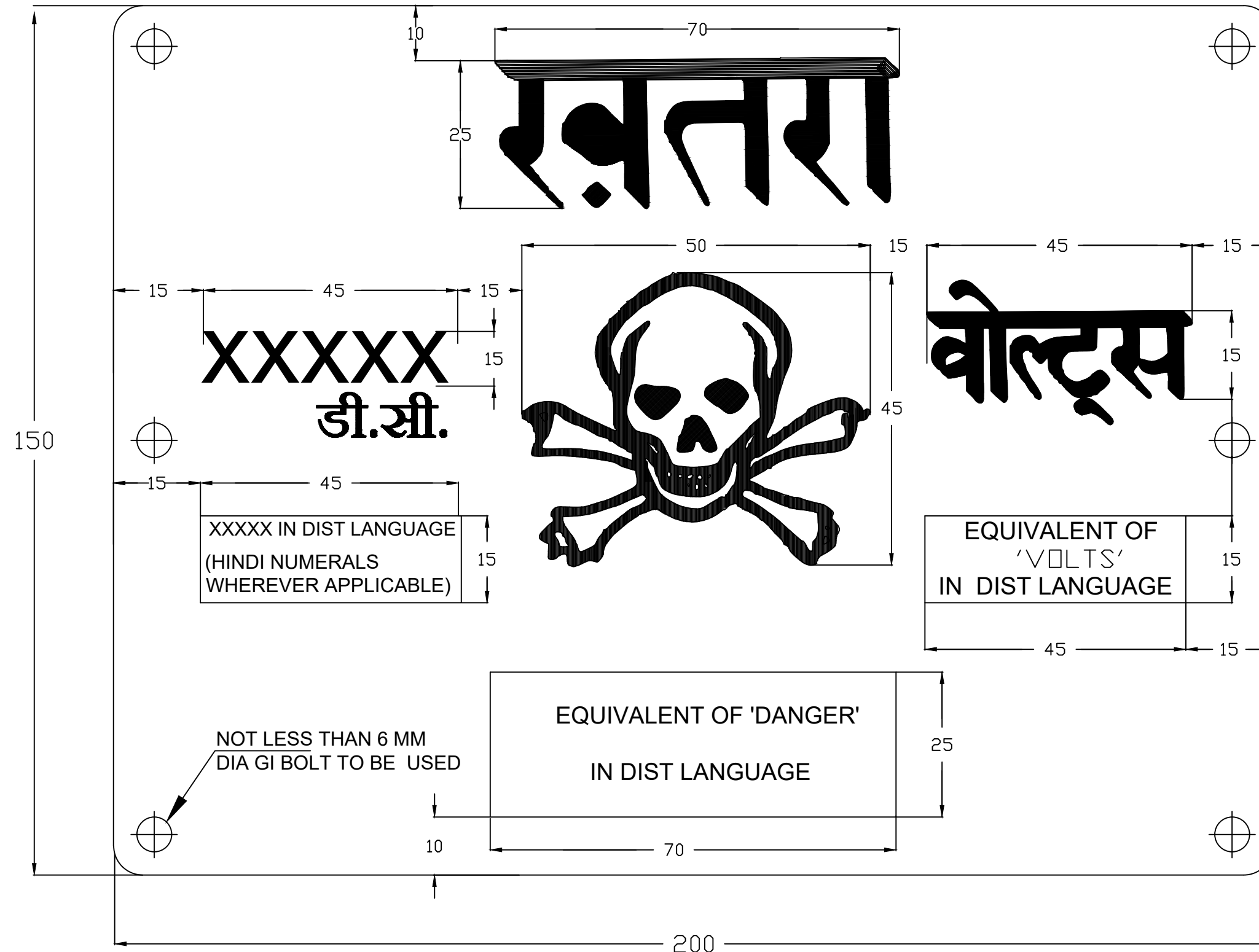


(TOP VIEW)



(FRONT VIEW)

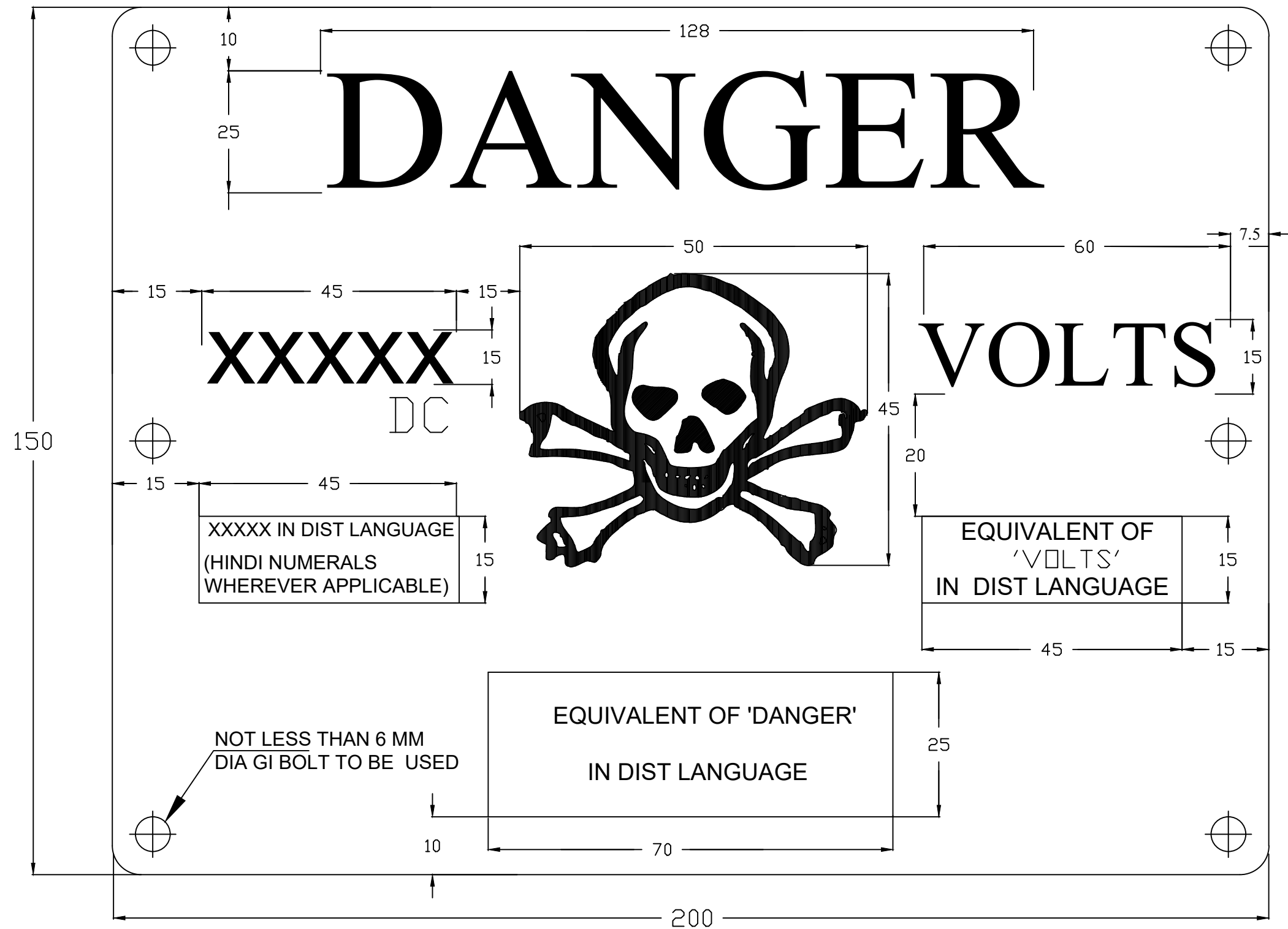
FIG. 12 INDICATIVE TYPE DESIGN FOR REFERENCE FOUR
MOUTH STAND POST



NOTE:-

- 1) All letterings should be centrally spaced.
- 2) The dimensions for the words in district language are mainly for guidance, however, care should be taken to space them centrally between the edges and the area of the skull and bones.
- 3) The location of the fixing holes shall be left to the choice of the user.
- 4) The corners of the plates should be rounded off.
- 5) All dimensions in mm.
- 6) XXXXX-voltage of the system be mention.

FIG. 13 DANGER PLATE FOR HAND PUMP CUM SOLAR PUMPING SYSTEM



NOTE:-

- 1) All letterings should be centrally spaced.
- 2) The dimensions for the words in district language are mainly for guidance, however, care should be taken to space them centrally between the edges and the area of the skull and bones.
- 3) The location of the fixing holes shall be left to the choice of the user.
- 4) The corners of the plates should be rounded off.
- 5) All dimensions in mm.
- 6) XXXXX-voltage of the system be mention.

Fig. 13A DANGER PLATE FOR HAND PUMP CUM SOLAR PUMPING SYSTEM

ANNEX - B*(Foreword)***COMMITTEE COMPOSITION**

Handpumps Sectional Committee MED 27

<i>Organization</i>	<i>Members</i>
In Personal Capacity (A-504, K G Chandra Vista, OMR, Opp to Satyabhama University, Sholinganallur, Chennai 600119)	SHRI G. SHANMUGANATHAN (Chairman)
AOV International, Noida	SHRI VISHAL KAPOOR SHRI K L VERMA (<i>Alternate</i>)
Ajay Industrial Corporation, Ghaziabad	SHRI AKHIL JAIN SHRI DIGENDRA PRATAP S (<i>Alternate</i>)
Apex International, Noida	SHRI LALIT KHANNA SHRI SANJAY KUMAR (<i>Alternate</i>)
Directorate of Groundwater Survey and Development Agency, Nagpur	SHRI H S DHOKLE SHRI LONKAR N. L. (<i>Alternate</i>)
Meera and Ceiko Pumps Private Limited, Hyderabad	SHRI MAHESH K. DESAI SHRI M. MAHENDER KUMAR (<i>Alternate</i>)
Ministry of Jal Shakti, Department of Drinking Water and Sanitation, New Delhi	SHRI D. RAJASHEKHAR SHRI SUMIT PRIYADARSHI (<i>Alternate</i>)
Office of Development Commissioner (MSME), New Delhi	SHRI SUNIL KUMAR SHRI SUVANKAR SANTRA (<i>Alternate</i>)
Ori Plast Limited, Bhubaneswar	SHRI SOMNATHMUKHERJEE SHRI S.K SATPATHY (<i>Alternate</i>)
Public Health Engineering Department, Bhopal	SHRI ASHOK BAGHEL SHRI ANURAG SHRIVASTAVA (<i>Alternate</i>)
Public Health Engineering Department, Government of Rajasthan, Jaipur	SHRI KISHOR KACHHAWA
SGS India Private Limited, Mumbai	LT. COL. PARMESWARNAI SHRI ARUN GAUR (<i>Alternate</i>)
Shree S.K. Industries, Patna	SHRI JUGAL KISHORE JHUNJHUNWALA
Span Pumps Private Limited, Pune	SHRI AJIT BHANDARI

<i>Organization</i>	<i>Members</i>
	SHRI NARENDRA PURANKAR (<i>Alternate</i>)
United Nations Children's Fund, New Delhi	SHRI MANISH WASUJA
Uttar Pradesh Jal Nigam, Lucknow	CHIEF ENGINEER MATERIAL MANAGER (<i>Alternate</i>)
In Personal Capacity (31, Heera Bagh Colony, University Road, Udaipur, Rajasthan 313001)	SHRI NIRMAL CHITTORA
BIS Directorate General	SHRI RAJNEESH KHOSLA, Scientist 'E' and Head (MED) [Representing Director General (Ex-Officio)]

Member Secretary
SHRI LOKRAJ MEENA
Scientist 'B' / Assistant Director (MED), BIS

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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